

REMARKS/ARGUMENTS

This Preliminary Amendment is being submitted concurrently with the filing of a Request for Continued Examination (RCE) in relation to the above-referenced patent application. An Amendment under 37 CFR § 1.116 was filed on March 17, 2003. The Examiner declined to enter that amendment. The present Amendment therefore includes changes previously proposed under the Amendment of March 17, 2003, along with additional changes. Specifically, claims 1-8 have been cancelled and new claims 9-21 has been added. Claims 9-21 are now pending in the application. The previously pending rejections are respectfully submitted to be obviated in view of the amendments and remarks presented herein, and all claims are now believed to be in condition for allowance.

The written description has been amended on page 3, lines 3-5 to correct a typographical error. No new matter has been added.

The present invention relates to an active pixel sensor with mixed analog and digital signal integration. Claim 9 recites:

An imaging system, comprising: an active pixel image sensor array comprising a plurality of pixels; at least one analog to digital converter for sampling and converting analog information from pixels in said array to digital values; and a digital memory array for storing and accumulating said digital values; wherein each pixel in said active pixel image sensor array is sampled multiple times during an integration period and each sampled value is stored in said digital memory array.

Merrill (U.S. Patent No. 5,892,541) relates to an imaging system in which "[e]ach time a cell is read, the number of photons collected by the cell is saved and the cell is reset if the cell would normally saturate by the end of the integration period." See abstract. Also, Merrill discloses "an imaging system and method for increasing the dynamic range of an array of active pixel sensor cells." See column 1, lines 9-11.

Merrill does not teach or suggest that "each pixel in said active pixel image sensor

array is sampled multiple times during an integration period and each sampled value is stored in said digital memory array." (emphasis added). Accordingly, Applicant's claimed invention distinguishes over Merrill.

Merrill in view of Fossum et al. (U.S. Patent No. 5,665,959) (hereinafter "Fossum") also do not teach or suggest "each pixel in said active pixel image sensor array is sampled multiple times during an integration period and each sampled value is stored in said digital memory array." Therefore, Merrill and Fossum, taken alone or in combination, do not anticipate claim 9 or render it obvious. Accordingly, Applicant's claimed invention distinguishes over Merrill in view of Fossum.

Merrill in view of Fossum and further in view of Mandl (U.S. Patent No. 5,248,971) also do not teach or suggest "each pixel in said active pixel image sensor array is sampled multiple times during an integration period and each sampled value is stored in said digital memory array." Therefore, Merrill, Fossum and Mandl, taken alone or in combination, do not anticipate claim 9 or render it obvious. Accordingly, Applicant's claimed invention distinguishes over Merrill in view of Fossum and further in view of Mandl.

Claims 10-17 each depend, directly or indirectly, from claim 9 and incorporate every limitation thereof. Claim 18 is a corresponding method claim in which outputs from each pixel are sampled and converted "to a digital value for each frame of the image a plurality of times during a desired integration period." Claims 19 and 20 depend directly from claim 18 and incorporate every limitation thereof. Claim 21 is a semiconductor chip apparatus corresponding to the imaging system of claim 9. Accordingly, claims 10-21 are patentable over the cited references.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of claims 1-8 and to pass this application to issue.

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Respectfully submitted,

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